

MOHIT GUPTA

Chennai, India • +91-78510 30532 • mgupta07@vt.edu

My research focuses on developing novel sustainable mineral processing technologies and first principles-based kinetic models to improve beneficiation of critical minerals and advancing froth flotation science. I also have expertise in scale-up of novel chemical processes, colloidal science including emulsion science, chemical thermodynamics, process optimization, and hydrometallurgy and would like to use my gained experience to address complex global challenges.

EDUCATION

PhD in Chemical Engineering

GPA: 4.0/4.0

August 2020- March 2024

Virginia Tech, Blacksburg, USA

Dissertation Title: *Modelling Flotation from First Principles using the Hydrophobic Force as a Kinetic Parameter*

Advisor: Dr. Roe-Hoan Yoon

- Developed a new flotation reagent that renders mineral surfaces super hydrophobic (contact angle $> 150^\circ$), significantly improving conventional flotation performance.
- Conducted surface force measurements at various electrolyte concentrations and temperatures demonstrating that hydrophobic interaction in foam films (air-water-air) and emulsion films (oil-water-oil) is enthalpy driven.
- Developed a first principle-based flotation kinetic model to accurately predict the grade and recovery of a copper flotation circuit. Provided detailed comparison between open and closed-circuit strategies.
- Developed the Jig Flotation cell technology for coarse mineral particle flotation, reducing the probability of bubble-particle detachment and improving copper coarse particle recovery by over 20%.
- Developed and modified two fine particle flotation technologies, Second Order Flotation (SOF) and Two-Liquid Flotation (TLF). Successfully lab-tested these technologies on copper tails, reducing footprint by over 100 times.

Master of Science (Thesis) in Chemical Engineering

GPA: 3.8/4.0

August 2015-May 2017

University of Florida, Gainesville, USA

Thesis Title: *Computational Analysis of the Effects of Water and Paired Tin Sites on Glucose Isomerization Reaction Using Tin-Beta Zeolite*

Advisor: Dr. David Hibbitts

- Successfully identified the effects of water and paired tin sites on glucose isomerization using Tin Beta Zeolite (Sn-BEA) and Titanium Beta Zeolite (Ti-BEA) to understand the reaction thermodynamics.
- Promoted discussions, provided technical support, and mentored students through tutorial sessions.

Bachelor of Technology in Chemical Engineering

GPA: 8.2/10.0

July 2009-June 2013

Malaviya National Institute of Technology, Jaipur, India

Final Project Title: *Kinetic Study of Lipase Catalysed Esterification*

- Conducted parametric study to optimize the activity of various lipases and deduce the reaction mechanism for the esterification reaction of Lauric Acid and n-Butanol.

RELEVANT INDUSTRIAL AND ACADEMIC EXPERIENCE

Manager, Process Engineering and Testing Services, Eriez Magnetics, Chennai

July 2025-Present

- Setting up the flotation laboratory at the Eriez Magnetics, Chennai.
- Successfully developed and proposed dry flowsheet beneficiation using dry magnetic separators for various applications such as silica minerals, heavy minerals sands, fused alumina, etc.

- Successfully designed the wet beneficiation flowsheets using wet magnetic separators for low- and high-grade hematite and magnetite ores.
- Designing wet beneficiation flowsheets for various low- and high-grade hematite and magnetite iron ores.
- Optimizing the sizing parameters for column flotation cell and wet high intensity magnetic separators by conducting lab-scale experimentation.
- Successfully organized various knowledge-sharing training sessions and seminars for internal and external clients on various coarse and fine particles flotation techniques and wet and dry magnetic separators.

Consultant, Blueshift Inc., U.S.A.

June 2025- Present

- Performed an extensive literature review on Critical Minerals Extraction from various secondary sources such as fly ash, red mud and acid mine drainage feedstocks.
- Developed a conceptual process flow diagram to extract REE oxides from fly ash and red mud feedstocks and performed a detailed mass and energy balance across all the unit operations including roaster, grinding mills, flotation cells, leaching vessels, ion-exchange columns, calciner, *etc.*
- Assisting the laboratory engineers in setting up the lab by preparing SOPs, workflow documents and guiding them how to perform the experiments efficiently.

Research Scientist, Mining and Minerals Engineering, Virginia Tech

March 2024-June 2025

- Successfully conducted parametric study to optimize the dosage of a new flotation collector that can increase the particle contact angle to greater than 150° for copper bearing ores.
- Designed and installed a Two-liquid flotation process development unit to purify the coal to <2% ash.
- Conducted surface force measurements in emulsion films (oil-water-oil) with various surfactants and at different temperatures to understand the thermodynamics of surface forces.
- Conducted flotation studies to improve the efficiency of extraction of water-based ink from fibrous material.
- Conducted parametric studies to optimize the lithium recovery from low-grade spodumene feedstocks.
- Conducted liberation studies using QEMSCAN to optimize the design of various mineral flotation circuits using a novel first principle-based flotation model.

Metallurgist II, Freeport-McMoRan Bagdad Operations, USA

June 2019-June 2020

- Worked as a lead metallurgist in the Copper-Molybdenum (Cu-Mo) separation (Moly) plant in Bagdad to maximize the production by conducting plant metallurgical surveys and implementing Six Sigma methodologies.
- Led the root-cause analysis (RCA) of a Cu-Mo thickener and Moly plant shut down to successfully isolate the major reasons leading to a loss of approximately \$20M.
- Part of the successful installation team of a flotation circuit to improve the production of Bagdad Concentrator.

Metallurgist I, Freeport-McMoRan Technology Centre Tucson (TCT), USA

July 2017-June 2019

- Worked as a project owner of pressure-oxidation batch lab to enhance the recovery of Cu and Mo extraction.
- Recovered dissolved heavy metals from the mine rejects by designing a novel activated charcoal packed column.
- Provided technical site support to Concentrate Leach Plant (CLP) and concentrators in various FMI sites.

Shift Field Engineer, Reliance Industries Limited, India

July 2013-July 2015

- Supervised the plant routine operations at the world's largest fluidized catalytic cracking unit (FCC).
- Worked as a commissioning engineer for a refinery off-gas cracker (ROGC) unit.
- Designed and reviewed models, processes, HAZOP, standard operating procedures (SOPs), PFDs and P&IDs.

- Worked on the designing of an amine absorption pilot-plant for capturing CO₂ from flue gases.
- Completed research project on treatment methods of heat stable salts formed in amine solutions to reduce the degradation of amine solutions used in the CO₂ absorption column.

TECHNICAL SKILLS

Programming/Software: Auto-Desk, CHEMCAD, Aspen-HYSYS, MS-office, MS Projects, SAP, Minitab, LAMMPS, METSIM, C, MATLAB, R-programming, and Python.

Characterization Tools: QEMSCAN, SEM, TEM, BET, XRF, XRD, GC-MS, Optical Tensiometer and Goniometer.

CERTIFICATIONS

Six Sigma Black Belt Certification, Arizona State University, USA

2019

AWARDS, FELLOWSHIPS AND SCHOLARSHIPS

Ramanujan Fellowship, Anusandhan National Research Foundation (ANRF), India (*Not availed*)

2025

Rong Yu Wan Best Ph.D. Dissertation Award, Society for Mining, Metallurgy, and Exploration (SME), USA

2025

Graduate Student Scholarship, SME Grand Canyon Section, USA

2023

WAAIME Scholarship, SME, USA

2022, 2023

Academic Achievement Award, University of Florida, USA

2015, 2016

TEACHING ACCOMPLISHMENTS

1. **Instructor of Record:** Fall 2024 VT MINE 3634 Fundamentals of Mineral Processing Coursework; Class Strength: 28; Student Evaluation: 4.5/6.0
2. **Instructor of Record:** Fall 2023 VT MINE 3634 Fundamentals of Mineral Processing Laboratory; Lab Strength: 21; Student Evaluation: 5.2/6.0.
3. **Graduate Teaching Assistant:** Fall 2023 VT MINE 3634 Fundamentals of Mineral Processing.
4. **Graduate Teaching Assistant:** Fall 2015 UF ECH 6905 Management of Unit Operations.

JOURNAL ARTICLES

1. **Gupta, M.** (2026). Dry Beneficiation of low-grade iron ore. (Drafted)
2. Rani, C., Kandpal M., **Gupta, M.**, Krylov, A., Jha, H.C., Saxena, S.K. & Kumar, R (2026). Early Detection of Fibrotic Cells Using "Raman Spectromicroscopy". *Physics Report*. (under review)
3. **Gupta, M.**, Huang K. & Yoon, R.H. (2026). Surface Forces in Foam and Emulsion Films. (Drafted)
4. **Gupta, M.** & Yoon, R.H. (2024). Maximizing the recovery and throughput of a rougher bank by improving the recovery of composite particles. *Minerals Engineering*, 207,108545.
5. **Gupta, M.**, Huang, K., Noble, C.A. & Yoon, R. H. (2023). Improving the performance of a low-grade porphyry copper ore flotation plant using a flotation simulator that can predict grade vs. recovery curves. *Minerals Engineering*, 202, 108243.
6. **Gupta, M.**, Huang, K., & Yoon, R. H. (2022). Predicting the recovery and grade of a rougher flotation circuit from liberation data. *Minerals Engineering*, 188, 107853.
7. Cordon, M. J., Harris, J. W., Vega-Vila, J. C., Bates, J. S., Kaur, S., **Gupta, M.**, ... & Gounder, R. (2018). Dominant role of entropy in stabilizing sugar isomerization transition states within hydrophobic zeolite pores. *Journal of the American Chemical Society (JACS)*, 140(43), 14244-14266.

CONFERENCE PEER-REVIEWED ARTICLES

1. Huang, K., **Gupta, M.**, Leland, J., Srinivasan A. & Yoon, R.H. (2026). A First-Principles Flotation Model for Scale-up, Design and Process Optimization, *IMPC 2026*. (Abstract accepted; article under review)
2. Leland, J., **Gupta, M.**, Srinivasan A. & Yoon, R.H. (2026). Jig Flotation of Coarse Particles. *IMPC 2026*. (Abstract accepted; article under review)
3. **Gupta, M.**, Lim, H., Noble, C.A. & Yoon, R.H. (2025). Optimizing flotation circuit using a model that can predict both grade and recoveries. *Extraction 2025*. November 16-20. Phoenix, AZ.
4. **Gupta, M.**, Leland, J., Srinivasan A. & Yoon, R.H. (2025). Coarse particle recovery by jig flotation. *Extraction 2025*. November 16-20. Phoenix, AZ.
5. **Gupta, M.**, & Yoon, R.H. (2024). Improving coarse particle flotation by control of surface and hydrodynamic forces. *IMPC 2024*. September 29- October 3. Washington DC.
6. **Gupta, M.**, Huang, K. & Yoon, R.H. (2024). Improving flotation using super collectors. *IMPC 2024*. September 29- October 3. Washington DC.
7. **Gupta, M.**, Huang, K., Youmans, N., Li, B. & Yoon, R.H. (2024). Two-liquid flotation for the recovery of ultrafine particles. *IMPC 2024*. September 29- October 3. Washington DC.
8. **Gupta, M.**, Lim, H., Noble, C.A. & Yoon, R.H. (2024). Simulation of flotation circuits using a model derived from first principles. *IMPC 2024*. September 29- October 3. Washington DC.
9. **Gupta, M.**, Huang, K. & Yoon, R.H. (2024). Role of surface forces in the kinetics of film thinning and contact angle formation. *IMPC 2024*. September 29- October 3. Washington DC.
10. Liu, W., Huang, K., Onel, O., **Gupta, M.**, Noble, A. & Yoon, R.H. (2024). Extraction of rare earth elements from nonconventional resources. *IMPC 2024*. September 29- October 3. Washington DC.
11. **Gupta, M.**, Huang, K., Noble, C.A. & Yoon, R.H. (2022). Maximizing throughput and recovery of flotation plants using a first principles model as a useful tool. *IMPS 2022*, December 15-17. Istanbul, Turkey.
12. **Gupta, M.**, Huang, K., Noble, C.A. & Yoon, R.H. (2022). Simulation of a copper rougher flotation bank with and without circulating load. *Procemin-Geomet 2022*, October 5-7, Santiago, Chile.
13. **Gupta, M.**, Huang, K., Noble, C.A. & Yoon, R.H. (2022). Assessing flotation circuit efficiencies using the liberation characteristics of particles in the circulating load. *AusIMM IMPC Asia Pacific 2022*. August 22-24. Melbourne, Australia.

CONFERENCE ORAL PRESENTATIONS

1. **Gupta, M.** (2026). Dry Beneficiation with Tailored Magnetic Circuits: A key strategy for sustainable Pre-concentration of low-grade hematite ore and reduce downstream processing challenges. *International Conference on Iron Ore Beneficiation (ICIOB)-2026*. April 09-10. JSW Steel, Bellary, India.
2. Das, S. & **Gupta, M.** (2026). Dry Beneficiation with Tailored Magnetic Circuits: A key strategy for sustainable Pre-concentration of low-grade hematite ore and reduce downstream processing challenges. *DRYBEN-2026*. March 23-24. Tata Steel, Jamshedpur, India.
3. **Gupta, M.** & Yoon, R.H. (2026). Surface Forces in foam and emulsions films. *SME 2026*. February 22-25, Salt Lake City, Utah, USA.
4. **Gupta, M.**, Huang, K., Noble, C.A., & Yoon, R.H (2026). Using a first-principles flotation model for scale-up, design and process optimization. *SME 2026*. February 22-25, Salt Lake City, Utah, USA.
5. Leland, J., **Gupta, M.**, Srinivasan A., Huang, K., & Yoon, R.H (2026). Two-liquid flotation (TLF) of thickener underflows to obtain low-ash and low-moisture coals. *SME 2026*. February 22-25, Salt Lake City, Utah, USA.
6. Leland, J., Srinivasan A., **Gupta, M.**, Huang, K., Noble, C.A. & Yoon, R.H (2026). Extending the particle size limits of flotation using acceleration forces. *SME 2026*. February 22-25, Salt Lake City, Utah, USA.
7. **Gupta, M.** (2026). Advanced Flotation Technologies. *JSW Bellary TechConnect 2025*. December 4. Bellary, India.
8. **Gupta, M.** (2025). Driving Sustainable Beneficiation: Unlocking coal & iron ore to power the future of steel. *International Conference & Exhibition on Enhancing Efficiency and Sustainability in Iron & Steel Sector*. November 11-12. Ranchi, India.
9. **Gupta, M.** (2025). Eriez's novel separation technologies for sustainable critical minerals processing. *CRISP 2025*. October 13-15. IIT-ISM Dhanbad, India.

10. **Gupta, M.** (2025). Driving Sustainable Beneficiation: Unlocking coal & iron ore to power the future of steel. *3rd Indian Steel Conference 2025*. September 9-10. Raipur, India.
11. **Gupta, M.**, Leland, J., Srinivasan A. & Yoon, R.H. (2025). Jig flotation of coarse particles. *SME 2025*. February 24-26, Denver, Colorado, USA.
12. **Gupta, M.** & Yoon, R.H. (2026). Role of electrical double layer (EDL) forces on flotation kinetics. *SME 2025*. February 24-26, Denver, Colorado, USA.
13. **Gupta, M.**, Mensah, E., Rousan, R., Liu, W., Huang, K., Onel, O., Noble, A., Esker, A. & Yoon, R.H. (2025). Extraction of heavy rare earth elements from coal byproducts. *SME 2025*. February 24-26, Denver, Colorado, USA.
14. **Gupta, M.**, Huang, K., Onel, O. & Yoon, R.H. (2024). Improving flotation using novel hydrophobizing agents. *SME 2024*. February 27-March 1. Phoenix, Arizona, USA.
15. **Gupta, M.**, Huang, K. & Yoon, R.H. (2024). Improving coarse particle recovery by jig flotation. *SME 2024*. February 27-March 1. Phoenix, Arizona, USA.
16. **Gupta, M.**, Huang, K., & Yoon, R.H. (2023). Thermodynamics of hydrophobic interactions in foam films. *ACS Spring 2023*. March 26-30. Indianapolis, Indiana, USA
17. **Gupta, M.**, Huang, K., & Yoon, R.H. (2023). Development of a high-rate flotation process for fine particles separation. *SME 2023*. February 26-March 1. Denver, Colorado, USA.
18. Huang, K., Keles, S., **Gupta, M.**, Noble, C.A. & Yoon, R.H. (2022). A flotation simulator that can predict grade vs. recovery curves from mineral liberation data. *SME 2022*. February 27-March 2. Salt Lake City, Utah, USA.
19. Li, B., Huang, K., **Gupta, M.**, Noble, C.A. & Yoon, R.H. (2021). Open vs. closed circuit configurations for flotation of low-grade porphyry copper ores. *SME 2021*. March 1-5. Virtual Event.

INVITED LECTURES

1. **Gupta, M.** (2026). Fundamentals of Flotation Part I: Role of Surface Chemistry in Flotation Performance. *MinPros Lecture Series 2026*. April 25. Online.

CONFERENCE POSTER PRESENTATIONS

1. **Gupta, M.**, & Yoon, R.H. (2024). Hydrophobic forces in foam and emulsion films. *VIII International Soft Matter Conference (ISMC2024)*. July 29-August 2. Raleigh, N.C., USA.
2. Huang, K., **Gupta, M.**, Noble, C.A. & Yoon, R.H. (2024). Hydrophobic interactions in unstable wetting films. *VIII International Soft Matter Conference (ISMC2024)*. July 29-August 2. Raleigh, N.C., USA.

SPONSORED RESEARCH PROJECTS

1. Yoon, R.H. (PI), **Gupta, M.** (Co-PI) and Noble, C.A. (2026). BHP Proposal. BHP Chile Inc. 02/01/2026-05/31/2026. \$80,872.
2. Yoon, R.H. , **Gupta, M.** & Noble, C.A. Recovery of heavy rare earth elements (HREEs). US Department of Energy (US-DOE). \$2,500,000. (Submitted).

PCT AND PROVISIONAL PATENTS

1. Yoon, R.H., **Gupta, M.** & Huang, K. "Methods and systems for facilitating flotation using super collectors." U.S. PCT Application PCT/US25/29155, filed May 13, 2025.
2. Yoon, R.H., **Gupta, M.** & Huang, K. & Noble, C.A. "Increasing flotation recovery and throughput." U.S. Patent Application 18/692,153 filed November 7, 2024.
3. Yoon, R.H., **Gupta, M.** and Noble, C.A. "Minerals recovery from waste storage facilities using advanced separation technologies." Drafted Patent Application.

REVIEWER RESPONSIBILITIES

Technical Papers Reviewed

Year	Journal	Articles Reviewed
2024-Present	Mining, Metallurgy and Exploration	5
2024-Present	Transactions of the Indian Institute of Metals	1

Conference Sessions Co-Chair

Month-Year	Conference	Session Title
Sept-2024	XXXI International Mineral Processing Congress, Washington DC.	Advanced Modeling and Control of Comminution

REFERENCES

1. **Dr. Roe-Hoan Yoon**, University Distinguished Professor, Department of Mining and Minerals Engineering, Virginia Tech, USA.
Contact No: +1-540-231-7056; Email id: ryoon@vt.edu
2. **Dr. Aaron Noble**, Department Head and Professor, Department of Mining and Minerals Engineering, Virginia Tech, USA.
Contact No: +1-540-231-0984; Email id: aaron.noble@vt.edu
3. **Dr. Kaiwu Huang**, Assistant Professor, Department of Mining and Minerals Engineering, Virginia Tech, USA.
Contact No: +1-540-231-9440; Email id: hkaiwu91@vt.edu